

IN THE CLAIMS

Cancel claims 1-10 without prejudice or disclaimer of the subject matter contained therein and add the following new claims 11-28 copied from Reexamination Certificate B1 4,369,563 issued May 13, 1986, for purposes of interference:

11. A control system for controlling a plurality of numerically controlled machine tools capable of selectively performing similar or different machining operations on parts delivered to said machine tools, which parts may be the same or different and each of which has a process indicia associated therewith, comprising:

storage means for storing parts;

delivery means, having access to each of the parts in said storage means and to each of said machine tools, for delivering a selected part between said storage means and selected of the machine tools;

central computer means comprising a plurality of programs for controlling machining operations at all of the machine tools;

control means responsive to any one of said process indicia for coupling to any one of said machine tools the program from said central computer means which controls the machining operation to be performed on a part delivered to said one machine tool and which part is identified by the process indicia associated therewith;

part identification means for identifying the process indicia of a part, including a record medium carried along with said part and forming said process indicia, and a read

unit associated with at least one machine tool and responsive to the record medium for identifying said process indicia represented thereby;

said control means including at least one data link connected between said central computer means and each of said machine tools for coupling programs to the machine tools associated therewith, and means for connecting the program identified by the process indicia to the data link for the machine tool at which the part is located.

12. A control system for controlling a plurality of numerically controlled machine tools capable of selectively performing similar or different machining operations on parts delivered to said machine tools, which parts may be the same or different and each of which has a process indicia associated therewith, comprising:

storage means for storing parts;

delivery means having access to each of the parts in said storage means and each of said machine tools, for delivering a selected part between said storage means and selected of the machine tools;

central computer means comprising a plurality of programs for controlling machining operations at all of the machine tools;

data link means coupling said computer means to each of said machine tools to transmit a program from said computer means to any one of said machine tools; and

control means responsive to any one of said process indicia for coupling to any one of said machine tools the program

from said central computer means which controls the machining operation to be performed on a part delivered to said one machine tool and which part is identified by the process indicia associated therewith. .

f 13. A control system for controlling a plurality of numerically controlled machine tools, some of which are capable of performing similar ^{machining} ~~machine~~ operations on a part, comprising:

central computer means having a memory for storing a plurality of different programs, each program providing information for controlling more than one of said plurality of machine tools to produce the same series of machining operations on a part;

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cont - a plurality of data link means coupling said computer means to each of said plurality of machine tools in order to transmit a program stored in said memory to any one of said plurality of machine tools;

a central supply of parts on which similar and different series of machining operations are to be performed by any one of said plurality of machine tools;

conveying means, having access to each of the parts in said central supply and to each of said plurality of machine tools, for conveying a selected part between said central supply and one of said plurality of machine tools;

means responsive to the conveyance of said part for generating a signal which identifies the series of machining operations which are to be performed on said conveyed part;

means for selecting the program stored in said memory which controls the same series of machining operations as

identified by the signal from said generating means and for transmitting said last named program over the data link connected to the machine tool to which said part has been conveyed.

14. A machine tool installation for machining workpieces comprising:

- (a) a plurality of complementary numerically controlled machine tools,
- (b) a source of workpieces,
- (c) transport means to transport a selected workpiece between said source and said machine tools along a path between said source and each of the machine tools, and
- (d) central programmed control means and data link means coupling said control means to each of said machine tools and to said transport means to control said transport means and to transmit a program from said control means to any one of said machine tools to control each of said machine tools so that each machine tool to which a workpiece is delivered by said transport means performs on said workpiece at least one predetermined machining operation.

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15. A machine tool installation comprising a plurality of complementary numerically controlled machine tools located adjacent a predetermined path, a source of workpieces for said machine tools, said source being located along said path, conveyor means to convey a selected workpiece along said path between the source and the machine tools from which there is access for workpieces to the plurality of machine tools so that each workpiece can be taken to a selection of machine tools

appropriate to the machining operations to be performed thereon, a plurality of cutting tools for the machine tools, and central control means including a plurality of programs for programming the machine tools to perform appropriate machining operations and means connecting said control means to said conveyor means and each of said machine tools to control the conveying operations carried out by the conveyor means to supply appropriate workpieces to the machine tools and to supply appropriate programs to the machine tools and to control the selection by the machine tools of appropriate cutting tools.

16. A machine tool installation for machining workpieces comprising:

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- (a) a plurality of complementary numerically controlled machine tools,
 - (b) at least one transfer station including means for supporting workpieces,
 - (c) means defining a path extending between said transfer station and each of said machine tools,
 - (d) storage means located along said path between said transfer station and said plurality of machine tools and adapted for storage of workpieces,
 - (e) transport means for transporting a selected workpiece along said path between said transfer station, said storage means and each of said machine tools, and
 - (f) central programmed control means and means connecting said control means to said transport means and to each of said machine tools to control said transport means to convey said workpiece between said transfer station and said storage

means and selected workpieces between said storage means and selected of said machine tools and to control each of said machine tools so that each machine tool to which a workpiece is delivered by said transport means performs on said workpiece at least one predetermined machining operation.

17. A machine tool installation for machining workpieces comprising:

(a) a plurality of complementary numerically controlled machine tools,

(b) means for transferring workpieces to and from said machine tool installation at at least one transfer station,

(c) transport means for transporting workpieces between said transfer station and each of said machine tools,

(d) said transport means including at least one storage section, there being access to each workpiece in said storage section and to each machine tool, for receiving, storing and dispensing workpieces, and

(e) programmed control means and means connecting said control means to said transport means and to each of said machine tools to control said transport means to convey from said storage section a selected one of said workpieces to and from selected of said machine tools and to control each of said machine tools so that each machine tool to which a workpiece is delivered by said transport means performs on said workpiece at least one predetermined machining operation.

18. A manufacturing system, comprising:

(a) a plurality of numerically controlled machine tools for machining a plurality of workpieces,

(b) storage means for storing said workpieces,

(c) distinguishing identification means associated with each of said workpieces,

(d) a conveyor extending along a path between the machine tools and storage means for conveying workpieces between said storage means and said machine tools and for presenting a workpiece selected from said storage means to the machine tools and including means at key points along said path for sensing said identification means and generating identification signals,

(e) a computer having a memory and means connecting said computer to each of said machine tools,

(f) means responsive to said identification signals for transferring to the memory of said computer instructions relating to a particular workpiece as it enters the conveyor for movement from one of said machine tools to another, and

(g) means responsive to said identification signals and associated with said computer to send instructions to a particular machine tool when the particular workpiece arrives at that particular machine tool.

19. A machine tool installation for machining workpieces of different types requiring different machining operations and comprising:

(a) a plurality of complementary numerically controlled machine tools located adjacent a predetermined path;

(b) storage means located adjacent said path and adapted for storing a plurality of selectively accessible workpieces;

(c) transport means operable to transport selected of said workpieces independently of other workpieces between said storage means and said machine tools along said path from which there is access to said selectively accessible workpieces in the storage means and each of the machine tools; and

(d) central programmed control means and means connecting said central programmed control means with each of said numerically controlled machine tools and said transport means to control movement along said path of selected of said workpieces by said transport means between at least one of said machine tools and said storage means and to control movement of each workpiece between said storage means and a predetermined selection of the machine tools.

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20. A control system for controlling a plurality of numerically controlled machine tools capable of selectively performing similar or different machining operations on parts delivered to said machine tools, which parts may be the same or different and each of which has a process indicia associated therewith, comprising:

storage means adapted for storing a plurality of selectively accessible parts while they are not being machined;

means for delivering selected of said parts from said storage means to selected of said machine tools;

central computer means comprising a plurality of programs for controlling machining operations at all of the machine tools;

control means responsive to any one of said process indicia for coupling to any one of said machine tools the program from said central computer means which controls the machining operation to be performed on a selected part delivered to said one machine tool and which selected part is identified by the process indicia associated therewith;

part identification means for identifying the process indicia of a part, including a record medium carried along with said part and forming said process indicia, and a read unit associated with at least one machine tool and responsive to the record medium for identifying said process indicia represented thereby;

said control means including at least one data link connected between said central computer means and each of said machine tools for coupling programs to the machine tools associated therewith, and means for connecting the program identified by the process indicia to the data link for the machine tool at which the selected part is located.

21. A control system for controlling a plurality of numerically controlled machine tools capable of selectively performing similar or different machining operations on parts delivered to said machine tools, which parts may be the same or different and each of which has a process indicia associated therewith, comprising:

storage means adapted for storing a plurality of selectively accessible parts while they are not being machined;

means for delivering selected of said parts from said storage means to selected of said machine tools;

central computer means comprising a plurality of programs for controlling machining operations at all of the machine tools;

data link means coupling said computer means to each of said machine tools to transmit a program from said computer means to any one of said machine tools; and

control means responsive to any one of said process indicia for coupling to any one of said machine tools the program from said central computer means which controls the machining operation to be performed on a selected part delivered to said one machine tool and which selected part is identified by the process indicia associated therewith.

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22. A control system for controlling a plurality of numerically controlled machine tools, some of which are capable of performing similar machining operations on a part, comprising:

central computer means having a memory for storing a plurality of different programs, each program providing information for controlling more than one of said plurality of machine tools to produce the same series of machining operations on a part;

a plurality of data link means coupling said computer means to each of said plurality of machine tools in order to transmit a program stored in said memory to any one of said plurality of machine tools;

a central supply adapted for storing a plurality of selectively accessible parts on which similar and different series of machining operations are to be performed by any one of said plurality of machine tools;

means for conveying a selected part from said central supply to one of said plurality of machine tools;

means responsive to the conveyance of said selected part for generating a signal which identifies the series of machining operations which are to be performed on said conveyed part;

means for selecting the program stored in said memory which controls the same series of machining operations as identified by the signal from said generating means and for transmitting said last named program over the data link connected to the machine tool to which said selected part has been conveyed.

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23. A machine tool installation for machining workpieces comprising:

(a) a plurality of complementary numerically controlled machine tools located adjacent a predetermined path,

(b) storage means located adjacent said path and adapted for storing a plurality of selectively accessible workpieces,

(c) transport means for transporting selected workpieces between said storage means and said machine tools along said path from which there is access to said selectively accessible workpieces in the storage means and each of the

machine tools and operable to convey selected workpieces independently of other workpieces, and

(d) central programmed control means and data link means coupling said control means to each of said machine tools to transmit a program from said control means to any one of said machine tools to control each of said machine tools so that each machine tool to which a selected workpiece is delivered by said transport means performs on said selected workpiece at least one predetermined machining operation.

24. A machine tool installation for machining workpieces comprising:

(a) a plurality of complementary numerically controlled machine tools,

(b) a source of workpieces adapted for storing a plurality of selectively accessible workpieces,

(c) transport means to transport selected workpieces between said source and said machine tools along a path from said source to each of said machine tools, and

(d) central programmed control means and data link means coupling said control means to said transport means and to each of said machine tools to control movement by said transport means along said path of selected of said workpieces between said source and at least one of said machine tools and to control each of said machine tools so that each machine tool to which a workpiece is delivered by said transport means performs on said workpiece at least one predetermined machining operation.

25. A machine tool installation for machining workpieces comprising:

- (a) a plurality of complementary numerically controlled machine tools,
- (b) a source of workpieces adapted for storing a plurality of selectively accessible workpieces,
- (c) transport means to transport selected workpieces between said source and said machine tools along a path from said source to each of the machine tools, and
- (d) central programmed control means and data link means coupling said control means to each of said machine tools and to said transport means to control said transport means and to transmit a program from said control means to any one of said machine tools to control each of said machine tools so that each machine tool to which a selected workpiece is delivered by said transport means performs on said selected workpiece at least one predetermined machining operation.

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26. A machine tool installation for machining workpieces comprising:

- (a) a plurality of complementary numerically controlled machine tools,
- (b) means for transferring workpieces to and from said machine tool installation at at least one transfer ^{station} station,
- (c) transport means for transporting workpieces between said transfer station and each of said machine tools,
- (d) said transport means including at least one storage section adapted for holding a plurality of selectively

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accessible workpieces and for selectively receiving, storing and dispensing each of said selectively accessible workpieces, and

(e) programmed control means and means connecting said control means to said transport means and to each of said machine tools to control said transport means to convey said workpieces selectively to and from selected of said machine tools and to control each of said machine tools so that each machine tool to which a selected workpiece is delivered by said transport means performs on said selected workpiece at least one predetermined machining operation.

27. A manufacturing system, comprising:

(a) a plurality of numerically controlled machine tools for machining a plurality of workpieces,

(b) storage means adapted for storing a plurality of selectively accessible workpieces,

(c) distinguishing identification means associated with each of said workpieces,

(d) a conveyor extending along a path between said storage means and the machine tools for presenting workpieces selected from said storage means to the machine tools and including means at key points along said path for sensing said identification means and generating identification signals,

(e) a computer having a memory and means connecting said computer to each of said machine tools,

(f) means responsive to said identification signals for transferring to the memory of said computer instructions relating to a particular selected workpiece as it enters the

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conveyor for movement from one of said machine tools to another,
and

(g) means responsive to said identification signals and associated with said computer to send instructions to a particular machine tool when the particular selected workpiece arrives at that particular machine tool.

28. A manufacturing system, comprising:

(a) a plurality of numerically controlled machine tools,

(b) storage means adapted for storing a plurality of selectively accessible workpieces,

(c) a conveyor extending between said storage means and each of the machine tools for presenting workpieces selected from said storage means to the machine tools,

(d) pallets for carrying selected workpieces and selectively movable along the conveyor from said storage means to said machine tools and from one machine tool to another,

(e) distinguishing identification means associated with each pallet,

(f) identification stations at key points along the conveyor, each station including means for reading the said identification means and generating an identification signal,

(g) a ready-access memory bank connected to each of the machine tools, and

(h) central programmed control means and means connecting said central programmed control means with each of said machine tools and with said conveyor, said central programmed control means including means responsive to an

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identification signal for transferring to the ready-access memory bank instructions relating to a particular workpiece as it enters the conveyor for movement from one machine tool to another and means responsive to an identification signal for transmitting instructions from said ready-access memory bank to a particular machine tool when the particular selected workpiece arrives at that particular machine tool.

REMARKS

Claims 11-28 have been copied from Reexamination Certificate B1 4,369,563 issued May 13, 1986 for purposes of interference therewith. The following schedule shows the relationship of the claims:

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SUPPORT FOR COPIED CLAIMS

Support in disclosure of this continuation application is based on the following analysis of Applicant's basic invention including the following limitations each bearing a JHL-designation.

JHL-A. A plurality of numerically controlled machine tools along a predetermined path;

JHL-B. A workpiece (work-in-progress) storage, source or supply;

JHL-C. Workpiece transport means including conveyor means for moving a selected workpiece from JHL-B to undergo selected operations by machine tools of JHL-A;

JHL-D. Master or centralized computer or programmed control means for the workpiece transport means and for each machine tool of JHL-A;

JHL-E. Workpiece selecting means for selecting the workpieces moving along said predetermined path to be worked on by a machine tool of JHL-A;

JHL-F. Part identification means including means for identifying the process indicia of a workpiece/part for automatic operation of a machine tool to operate on the workpiece/part.

JHL-G. Data link means for transmitting signals to and from JHL-D.

Each of the copied claims are reproduced below referencing the above JHL- designations, figures, specific parts shown in figures, and/or pages and lines of the written description as presented in the substitute specification as it was entered into the parent application Serial No. 251,656.

11. A control system for controlling a plurality of numerically controlled machine tools capable of selectively performing similar or different machining operations on parts delivered to said machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.), which parts may be the same or different and each of which has a process indicia (read by 35, 48, 117, 118 in Figs. 2, 4, 5, 6, 7; page 43, line 13; page 13, lines 25-26) associated therewith, comprising:

storage means for storing parts (JHL-B; Figs. 6 and 7; conveyor 75; inherent in system; page 42, lines 24-26);

delivery means (JHL-B; JHL-C; Figs. 6 and 7; 72, 72-2, 72-3), having access to each of the parts in said storage means and to each of said machine tools, for delivering a selected part between said storage means and selected of the machine tools;

central computer means (JHL-D; Figs. 1, 3, 3', computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) comprising a plurality of programs (Fig. 1; controller 17) for controlling machining operations at all of the machine tools;

control means (Figs. 1, 3, 4, 5, 6, 7; MTC, PrC's and described operation; page 45, lines 2-17) responsive to any one of said process indicia for coupling to any one of said machine tools the program from said central computer means which

controls the machining operation to be performed on a part delivered to said one machine tool and which part is identified by the process indicia associated therewith;

part identification means (JHL-F; Figs. 3, 4, 5, 6, 7; 117, 118, 35, 48; page 44 lines 5-12) for identifying the process indicia of a part, including a record medium (page 13, line 25) carried along with said part and forming said process indicia, and a read unit (35, Figs. 2; 2'; page 14, line 25 to page 15, line 1) associated with at least one machine tool and responsive to the record medium for identifying said process indicia represented thereby;

said control means including at least one data link (JHL-G; electrical connecting lines between 11 and 16-1; 16-2; etc; between computer 50 and units 48 in Fig. 3) connected between said central computer means and each of said machine tools for coupling programs to the machine tools associated therewith, and means (necessarily a part of system to make it operative) for connecting the program identified by the process indicia to the data link for the machine tool at which the part is located.

12. A control system for controlling a plurality of numerically controlled machine tools capable of selectively performing similar or different machining operations on parts delivered to said machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.), which parts may be the same or different and each of which has a process indicia associated therewith, comprising:

storage means for storing parts (JHL-B; Figs. 6 and 7; conveyor 75; inherent in system; page 42, lines 24-26);

delivery means (JHL-B; JHL-C; Figs. 6 and 7; 72, 72-2, 72-3) having access to each of the parts in said storage means and each of said machine tools, for delivering a selected part between said storage means and selected of the machine tools;

central computer means (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) comprising a plurality of programs for controlling machining operations at all of the machine tools;

data link means (JHL-G; page 45, lines 2-17; electrical connecting lines shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) coupling said computer means to each of said machine tools to transmit a program from said computer means to any one of said machine tools; and

control means (MTC; PrC's; controllers 17 and each described operation) responsive to any one of said process indicia for coupling to any one of said machine tools the program from said central computer means which controls the machining operation to be performed on a part delivered to said one machine tool and which part is identified by the process indicia (units 35; pages 13, lines 25-26; page 14, line 25 to page 15, line 1; page 43, line 13) associated therewith.

13. A control system for controlling a plurality of numerically controlled machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.), some of which are capable of performing similar machine operations on a part, comprising:

central computer means (JHL-D; Fig. 1; computer 11; Fig. 3, computer 50; Figs. 6 and 7; page 43, lines 16-21) having

a memory for storing a plurality of different programs, each program providing information for controlling more than one of said plurality of machine tools to produce the same series of machining operations on a part (inherent function);

a plurality of data link means (JHL-G; page 45, lines 2-17; electrical connecting lines shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) coupling said computer means to each of said plurality of machine tools in order to transmit a program stored in said memory to any one of said plurality of machine tools;

a central supply of parts (necessarily required to be operative; inherent; see U.S. Patent 3,049,247) on which similar and different series of machining operations are to be performed by any one of said plurality of machine tools;

conveying means (Figs. 6 and 7; conveyor 75), having access to each of the parts in said central supply and to each of said plurality of machine tools, for conveying a selected part between said central supply and one of said plurality of machine tools;

means (Figs. 2, 3, 4, 5, 6, and 7; parts 35, 48, 117, 118) responsive to the conveyance of said part for generating a signal which identifies the series of machining operations which are to be performed on said conveyed part;

means for selecting the program stored (MTC, PrC's and controllers 17 as shown in Figures) in said memory which controls the same series of machining operations as identified by the signal from said generating means and for transmitting said last named program (power source and electrical connecting lines)

over the data link connected to the machine tool to which said part has been conveyed.

14. A machine tool installation for machining workpieces comprising:

(a) a plurality of complementary numerically controlled machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.),

(b) a source of workpieces (JHL-B; Figs. 6 and 7; conveyor 75; inherent in system; page 42, lines 24-26),

(c) transport means (conveyor 75; 72; 72-2; 72-3) to transport a selected workpiece between said source and said machine tools along a path between said source and each of the machine tools, and

(d) central programmed control means (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) and data link means (JHL-G; page 45, lines 2-17; electrical connecting lines shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) coupling said control means to each of said machine tools and to said transport means (page 43, lines 8-15; page 44 lines 10-12) to control said transport means and to transmit a program (PrC's, Controllers 17) from said control means to any one of said machine tools to control each of said machine tools so that each machine tool to which a workpiece is delivered by said transport means performs on said workpiece at least one predetermined machining operation (inherent function of JHL system).

15. A machine tool installation comprising a plurality of complementary numerically controlled machine tools located

adjacent a predetermined path (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.), a source of workpieces (JHL-B; Figs. 6 and 7; conveyor 75; inherent in system; page 42, lines 24-26) for said machine tools, said source being located along said path (page 42, lines 24-26), conveyor means (Figs. 6 and 7; conveyor 75) to convey a selected workpiece along said path between the source and the machine tools from which there is access for workpieces to the plurality of machine tools so that each workpiece can be taken to a selection of machine tools appropriate to the machining operations to be performed thereon, a plurality of cutting tools (page 44, line 23, 27) for the machine tools, and central control means (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) including a plurality of programs for programming the machine tools to perform appropriate machining operations and means (page 43, lines 8-15; page 44, lines 10-12) connecting said control means to said conveyor means and each of said machine tools to control the conveying operations carried out by the conveyor means to supply appropriate workpieces to the machine tools and to supply appropriate programs to the machine tools and to control the selection by the machine tools of appropriate cutting tools (inherent function of JHL system).

16. A machine tool installation for machining workpieces comprising:

(a) a plurality of complementary numerically controlled machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.),

(b) at least one transfer station (location where 72, 72-2, 72-3 pushes workpiece toward machine tool) including means for supporting workpieces (76, 76-1, 76-2, 76-3),

(c) means defining a path extending between said transfer station and each of said machine tools (one example - 72 to 76),

(d) storage means (JHL-B; Figs. 6 and 7; conveyor 75; inherent in system; page 42, lines 24-26) located along said path between said transfer station and said plurality of machine tools and adapted for storage of workpieces,

(e) transport means (conveyor 75; 72, 72-2, 72-3) for transporting a selected workpiece along said path between said transfer station, said storage means and each of said machine tools, and

(f) central programmed control means (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) and means (JHL-G; page 45, lines 2-17; electrical connecting lines shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) connecting said control means to said transport means and to each of said machine tools to control said transport means to convey said workpiece between said transfer station and said storage means and selected workpieces between said storage means and selected of said machine tools and to control each of said machine tools so that each machine tool to which a workpiece is delivered by said transport means performs on said workpiece at least one predetermined machining operation (inherent in the JHL system which carries out function of each limitation).

17. A machine tool installation for machining workpieces comprising:

(a) a plurality of complementary numerically controlled machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.),

(b) means for transferring workpieces to and from said machine tool installation at at least one transfer station (location where 72, 72-2, 72-3 pushes workpiece toward machine tool),

(c) transport means (conveyor 75; 72, 72-2, 72-3) for transporting workpieces between said transfer station and each of said machine tools,

(d) said transport means including at least one storage section (page 42, lines 24-26), there being access to each workpiece in said storage section and to each machine tool, for receiving, storing and dispensing workpieces, and

(e) programmed control means (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) and means connecting (JHL-G; page 45, lines 2-17; electrical connecting lines shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) said control means to said transport means and to each of said machine tools to control said transport means to convey from said storage section a selected one of said workpieces to and from selected of said machine tools and to control each of said machine tools so that each machine tool to which a workpiece is delivered by said transport means performs on said workpiece at least one predetermined machining operation (inherent in the JHL system which carries out function of each limitation).

18. A manufacturing system, comprising:

(a) a plurality of numerically controlled machine tools for machining a plurality of workpieces (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.),

(b) storage means for storing said workpieces (JHL-B; Figs. 6 and 7; conveyor 75; inherent in system; page 42, lines 24-26),

(c) distinguishing identification means (read by 35, 48, 117, 118 in Figs. 2, 4, 5, 6, 7; page 43, line 13; page 13, lines 25-26) associated with each of said workpieces,

(d) a conveyor (75) extending along a path between the machine tools and storage means for conveying workpieces between said storage means and said machine tools and for presenting a workpiece selected from said storage means to the machine tools and including means (JHL-F, Figs. 3-7; 35, 48, 117, 118; page 44, lines 5-12) at key points along said path for sensing said identification means and generating identification signals,

(e) a computer (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) having a memory and means (JHL-G; page 45, lines 2-17; electrical connecting lines shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) connecting said computer to each of said machine tools,

(f) means responsive to said identification signals for transferring to the memory of said computer instructions relating to a particular workpiece as it enters the conveyor for movement from one of said machine tools to another (inherent function of JHL system; see also written description of Figs. 1, 3, 3', 4, 5, 6 and 7), and

(g) means responsive to said identification signals and associated with said computer to send instructions to a particular machine tool when the particular workpiece arrives at that particular machine tool (inherent function of JHL system; see also written description of Figs. 1, 3, 3', 4, 5, 6 and 7).

19. A machine tool installation for machining workpieces of different types requiring different machining operations and comprising:

(a) a plurality of complementary numerically controlled machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.) located adjacent a predetermined path;

(b) storage means (JHL-B; Figs. 6 and 7; conveyor 75; inherent in system; page 42, lines 24-26) located adjacent said path and adapted for storing a plurality of selectively accessible workpieces;

(c) transport means (conveyor 75; 72, 72-2, 72-3) operable to transport selected of said workpieces independently of other workpieces between said storage means and said machine tools along said path from which there is access to said selectively accessible workpieces in the storage means and each of the machine tools; and

(d) central programmed control means (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) and means (JHL-G; page 45, lines 2-17; electrical connecting lines shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) connecting said central programmed control means with each of said numerically controlled machine tools and said transport means to control movement along said path of selected

of said workpieces by said transport means between at least one of said machine tools and said storage means and to control movement of each workpiece between said storage means and a predetermined selection of the machine tools (inherent function of JHL system).

20. A control system for controlling a plurality of numerically controlled machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.) capable of selectively performing similar or different machining operations on parts delivered to said machine tools, which parts may be the same or different and each of which has a process indicia (read by 35, 48, 117, 118 in Figs. 2, 4, 5, 6, 7; page 43, line 13; page 13, lines 25-26) associated therewith, comprising:

storage means (JHL-B; Figs. 6 and 7; conveyor 75; inherent in system; page 42, lines 24-26) adapted for storing a plurality of selectively accessible parts while they are not being machined;

means for delivering (conveyor 75) selected of said parts from said storage means to selected of said machine tools;

central computer means (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) comprising a plurality of programs for controlling machining operations at all of the machine tools;

control means (Figs. 1, 3, 4, 5, 6, 7; MTC, PrC's and described operation; page 45, lines 2-17) responsive to any one of said process indicia for coupling to any one of said machine tools the program from said central computer means which controls the machining operation to be performed on a selected

part delivered to said one machine tool and which selected part is identified by the process indicia associated therewith;

part identification means (JHL-F; Figs. 3, 4, 5, 67, 117, 118, 35, 48; page 44, lines 5-12) for identifying the process indicia of a part, including a record medium carried along with said part and forming said process indicia, and a read unit associated with at least one machine tool and responsive to the record medium for identifying said process indicia represented thereby;

said control means including at least one data link (JHL-G; page 45, lines 2-17; electrical connecting lines shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) connected between said central computer means and each of said machine tools for coupling programs to the machine tools associated therewith, and means (necessarily a part of system to make it operative) for connecting the program identified by the process indicia to the data link for the machine tool at which the selected part is located.

21. A control system for controlling a plurality of numerically controlled machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.) capable of selectively performing similar or different machining operations on parts delivered to said machine tools, which parts may be the same or different and each of which has a process indicia (read by 35, 48, 117, 118 in Figs. 2, 4, 5, 6, 7; page 43, line 13; page 13, lines 25-26) associated therewith, comprising:

storage means (JHL-B; Figs. 6 and 7; conveyor 75; inherent in system; page 42, lines 24-26) adapted for storing a

plurality of selectively accessible parts while they are not being machined;

means for delivering (conveyor 75) selected of said parts from said storage means to selected of said machine tools;

central computer means (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) comprising a plurality of programs for controlling machining operations at all of the machine tools;

data link means (JHL-G; page 45, lines 2-17; electrical connecting lines between 11 and 16-1; 16-2; etc; between computer 50 and units 48 shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) coupling said computer means to each of said machine tools to transmit a program from said computer means to any one of said machine tools; and

control means (Figs. 1, 3, 4, 5, 6, 7; MTC, PrC's and described operation; page 45, lines 2-17) responsive to any one of said process indicia for coupling to any one of said machine tools the program from said central computer means which controls the machining operation to be performed on a selected part delivered to said one machine tool and which selected part is identified by the process indicia associated therewith.

22. A control system for controlling a plurality of numerically controlled machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.), some of which are capable of performing similar machining operations on a part, comprising:

central computer means (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) having a memory for storing a plurality of different programs,

each program providing information for controlling more than one of said plurality of machine tools to produce the same series of machining operations on a part;

a plurality of data link means (JHL-G; page 45, lines 2-17; electrical connecting lines between 11 and 16-1; 16-2; etc; between computer 50 and units 48 shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) coupling said computer means to each of said plurality of machine tools in order to transmit a program stored in said memory to any one of said plurality of machine tools;

a central supply (JHL-B; Figs. 6 and 7; conveyor 75; inherent in system; page 42, lines 24-26) adapted for storing a plurality of selectively accessible parts on which similar and different series of machining operations are to be performed by any one of said plurality of machine tools;

means for conveying (conveyor 75; 72, 72-2, 72-3) a selected part from said central supply to one of said plurality of machine tools;

means (35, 48, 117, 118) responsive to the conveyance of said selected part for generating a signal which identifies the series of machining operations which are to be performed on said conveyed part;

means for selecting the program stored (MTC, PrC's and controllers 17 as shown in Figures) in said memory which controls the same series of machining operations as identified by the signal from said generating means and for transmitting said last named program (power source and electrical connecting lines) over the data link connected to the machine tool to which said selected part has been conveyed.

23. A machine tool installation for machining workpieces comprising:

(a) a plurality of complementary numerically controlled machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.) located adjacent a predetermined path,

(b) storage means (JHL-B; Figs. 6 and 7; conveyor 75; inherent in system; page 42, lines 24-26) located adjacent said path and adapted for storing a plurality of selectively accessible workpieces,

(c) transport means (conveyor 75; 72, 72-2, 72-3) for transporting selected workpieces between said storage means and said machine tools along said path from which there is access to said selectively accessible workpieces in the storage means and each of the machine tools and operable to convey selected workpieces independently of other workpieces, and

(d) central programmed control means (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) and data link means (JHL-G; page 45, lines 2-17; electrical connecting lines shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) coupling said control means to each of said machine tools to transmit a program (PrC's, controllers 17) from said control means to any one of said machine tools to control each of said machine tools so that each machine tool to which a selected workpiece is delivered by said transport means performs on said selected workpiece at least one predetermined machining operation (inherent function of JHL system).

24. A machine tool installation for machining workpieces comprising:

(a) a plurality of complementary numerically controlled machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.),

(b) a source of workpieces (JHL-B; Figs. 6 and 7; conveyor 75; inherent in system; page 42, lines 24-26) adapted for storing a plurality of selectively accessible workpieces,

(c) transport means (conveyor 75; 72, 72-2, 72-3) to transport selected workpieces between said source and said machine tools along a path from said source to each of said machine tools, and

(d) central programmed control means (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) and data link means (JHL-G; page 45, lines 2-17; electrical connecting lines shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) coupling said control means to said transport means (page 43, lines 8-15; page 44, lines 10-12) and to each of said machine tools to control movement by said transport means along said path of selected of said workpieces between said source and at least one of said machine tools and to control each of said machine tools so that each machine tool to which a workpiece is delivered by said transport means performs on said workpiece at least one predetermined machining operation (inherent function of JHL system).

25. A machine tool installation for machining workpieces comprising:

(a) a plurality of complementary numerically controlled machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.),

(b) a source of workpieces (JHL-B; Figs. 6 and 7; conveyor 75; inherent in system; page 42, lines 24-26) adapted for storing a plurality of selectively accessible workpieces,

(c) transport means (conveyor 75; 72, 72-2, 72-3) to transport selected workpieces between said source and said machine tools along a path from said source to each of the machine tools, and

(d) central programmed control means (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) and data link means (JHL-G; page 45, lines 2-17; electrical connecting lines shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) coupling said control means to each of said machine tools and to said transport means (page 43, lines 8-15; ge 44, lines 10-12) to control said transport means and to transmit a program (PrC's, controllers 17) from said control means to any one of said machine tools to control each of said machine tools so that each machine tool to which a selected workpiece is delivered by said transport means performs on said selected workpiece at least one predetermined machining operation (inherent function of JHL system).

26. A machine tool installation for machining workpieces comprising:

(a) a plurality of complementary numerically controlled machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.),

(b) means for transferring workpieces (72, 72-2, 72-3) to and from said machine tool installation at at least one transfer station,

(c) transport means (conveyor 75) for transporting workpieces between said transfer station and each of said machine tools,

(d) said transport means including at least one storage section adapted for holding a plurality of selectively accessible workpieces and for selectively receiving, storing and dispensing each of said selectively accessible workpieces, and

(e) programmed control means (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) and means connecting (JHL-G; page 45, lines 2-17; electrical connecting lines shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) said control means to said transport means and to each of said machine tools to control said transport means to convey said workpieces selectively to and from selected of said machine tools and to control each of said machine tools so that each machine tool to which a selected workpiece is delivered by said transport means performs on said selected workpiece at least one predetermined machining operation (inherent function of JHL system).

27. A manufacturing system, comprising:

(a) a plurality of numerically controlled machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.) for machining a plurality of workpieces,

(b) storage means (JHL-B; Figs. 6 and 7; conveyor 75; inherent in system; page 42, lines 24-26) adapted for storing a plurality of selectively accessible workpieces,

(c) distinguishing identification means (read by 35, 48, 117, 118 in Figs. 2, 4, 5, 6, 7; page 43, line 13; page 13, lines 25-26) associated with each of said workpieces,

(d) a conveyor (75) extending along a path between said storage means and the machine tools for presenting workpieces selected from said storage means to the machine tools and including means (JHL-F; Figs. 3, 4, 5, 67, 117, 118, 35, 48; page 44, lines 5-12) at key points along said path for sensing said identification means and generating identification signals,

(e) a computer (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) having a memory and means (JHL-G; page 45, lines 2-17; electrical connecting lines shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) connecting said computer to each of said machine tools,

(f) means responsive to said identification signals for transferring to the memory of said computer instructions relating to a particular selected workpiece as it enters the conveyor for movement from one of said machine tools to another (inherent function of JHL system; see also written description of Figs. 1, 3, 3', 4, 5, 6, and 7) , and

(g) means responsive to said identification signals and associated with said computer to send instructions to a particular machine tool when the particular selected workpiece arrives at that particular machine tool (inherent function of JHL system; see also written description of Figs. 1, 3, 3', 4, 5, 6 and 7).

28. A manufacturing system, comprising:

- (a) a plurality of numerically controlled machine tools (JHL-A; Figs. 6 and 7; 16-1, 16-2, etc.),
- (b) storage means (JHL-B; Figs. 6 and 7; conveyor 75; inherent in system; page 42, lines 24-26) adapted for storing a plurality of selectively accessible workpieces,
- (c) a conveyor (75) extending between said storage means and each of the machine tools for presenting workpieces selected from said storage means to the machine tools,
- (d) pallets (Fig. 6; WP, page 43, lines 7-15, 20; page 44, lines 5-9) for carrying selected workpieces and selectively movable along the conveyor from said storage means to said machine tools and from one machine tool to another,
- (e) distinguishing identification means (read by 35, 48, 117, 118 in Figs. 2, 4, 5, 6, 7; page 43, line 13; page 13, lines 25-26) associated with each pallet,
- (f) identification stations (location of 35, 117, 118) at key points along the conveyor, each station including means (35, 117, 118) for reading the said identification means and generating an identification signal,
- (g) a ready-access memory bank (controller 17) connected to each of the machine tools, and
- (h) central programmed control means (JHL-D; Figs. 1, 3, 3'; computer 50; Figs. 6, 7; unit 11, MTC; page 43, lines 16-21) and means (JHL-G; page 45, lines 2-17; electrical connecting lines shown in Figs. 1, 3, 3', 4, 5, inherent in Figs. 6 and 7) connecting said central programmed control means with each of said machine tools and with said conveyor, said central

programmed control means including means responsive to an identification signal for transferring to the ready-access memory bank instructions relating to a particular workpiece as it enters the conveyor for movement from one machine tool to another and means responsive to an identification signal for transmitting instructions from said ready-access memory bank to a particular machine tool when the particular selected workpiece arrives at that particular machine tool (inherent function of JHL system; see also written description of Figs. 1, 3, 3', 4, 5, 6, and 7).

Filed herewith are the following documents pursuant 37 C.F.R. 1.608:

1. Declaration of Jerome H. Lemelson with accompanying documents in an attached envelope.
2. Declaration of Neil F. Markva.


SUBSTITUTE SPECIFICATION

Reference has been made to the substitute specification which has been entered by Examiner Bilinsky in the parent application S.N. 251,656.

It is respectfully requested that the interference be declared as soon as possible.

Respectfully submitted,

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